COGNITIVE DIFFERENCES IN AUTISM AND LEARNING:

Professional Development for Physical Therapists

Student name: Emma Norton
Student number: s5098917
Assessment: Task 2 – Cognitive differences in autism and learning
Word Count: 1456
Course: Autism, Thinking, and Learning (7177EDN)
Lecturer: Raechel Smart

PHYSICAL THERAPY, LEARNING AND AUTISM

In this presentation:

- Take a dive into the theories and concepts underpinning cognitive differences in autism
- Explore how these differences influence learning and skill acquisition
- Recognise how autistic learning profiles may differ from neurotypical populations
- Highlight the role of physical therapists in building functional capacity and facilitating new skill learning
- Present strategies to:
  - Adapt interventions
  - Maximise engagement and success

EXECUTIVE FUNCTIONING IN AUTISM

Definition: Higher-order cognitive processes for goal-directed behaviour
Includes: inhibition, working memory, cognitive flexibility, planning

- **Inhibition**
  - Challenge in ~50% of autistic adults
  - Worse under time constraints; better with visual cues
  - More pronounced if Attention Deficit Hyperactivity Disorder (ADHD) co-occurs
- **Working Memory**
  - Mixed findings; challenges mainly on complex/spatial tasks
  - Some perform comparably to neurotypical peers
- **Cognitive Flexibility**
  - ~50% experience challenges adapting to change
  - Repetitive choices highlight preference for familiarity
  - Clear, explicit task instructions can improve performance
- **Decision-Making**
  - Challenges less frequent but include slower choices, risk aversion, difficulty using contextual info
  - Strengths: less influenced by societal pressures → potentially better decisions

EXECUTIVE FUNCTION AND PHYSICAL THERAPY

- **Motor–EF Link**
  - Poorer sensory–motor skills → greater executive dysfunction (Alsaedi, 2025)
  - Clinical assumption: greater motor challenges = greater EF regulation challenges
- **Behavioural Outcomes** (Fernandez-Prieto et al., 2020)
  - EF difficulties → anxiety, isolation, aggression, rule-breaking
  - Poor balance, endurance, body awareness → emotional regulation & social challenges
- **Exercise Benefits** (Jia et al., 2024)
  - Strong evidence for improvements in motor, cognitive & social skills

Key question: How do we support learning skills in therapy?

THE DOUBLE EMPATHY PROBLEM

- **Definition: Mutual breakdown in communication between autistic & non-autistic individuals (Milton, 2012)**
  - Differences in expressing, perceiving, and interpreting social/emotional cues
  - Challenges reflect differences in neurotypes, not deficits
- **Bidirectional Impact** (Milton, 2012):
  - Misunderstandings occur because each neurotype experiences the world differently
  - Empathy gap is two-way, not a one-sided deficit
- **Behavioural Adaptations** (Ekdahl, 2023):
  - Autistic individuals may adapt behaviour around neurotypical people
  - Human development is shaped by reciprocal interactions
- **Consequences** (Mitchell et al., 2019):
  - Negative perceptions from neurotypical peers → systematically lower expectations
  - Can lead to social isolation, reduced sense of belonging
  - Ultimately impacts self-worth and quality of life

THE DOUBLE EMPATHY PROBLEM AND PHYSICAL THERAPY

- **Role of Allied Health Professionals:**
  - Observations & client reports guide treatment and progression
  - Understanding mechanism of DEP helps ensure clear, meaningful communication of expectations
- **Educational Impact** (Hummerstone & Parsons, 2022):
  - Poor understanding of preferences
  - Autistic strengths overlooked
  - Limited autism knowledge among staff
  - Minimal input from the child
- **Peer Engagement** (Chen, Schneider, & Patten, 2022):
  - Barriers: limited participation negotiation & differing interests
  - Success when participation aligns with strengths and shared interests are mutually meaningful

STRATEGIES FOR SUCCESS IN THERAPY

Evidence-Based Strategies for Supporting Autistic Individuals (Sandbank et al., 2021):

- Selecting appropriate, evidence-based strategies is crucial for effective support
- Autism research has evolved:
  - Changes in definitions & diagnostic criteria
  - Shifts in stereotypes and treatment approaches
- Many therapies used historically **lack evidence and effectiveness**
- Misconceptions persist about how to support autistic individuals across their lifespan

STRATEGY 1 – EXERCISE/PHYSICAL ACTIVITY

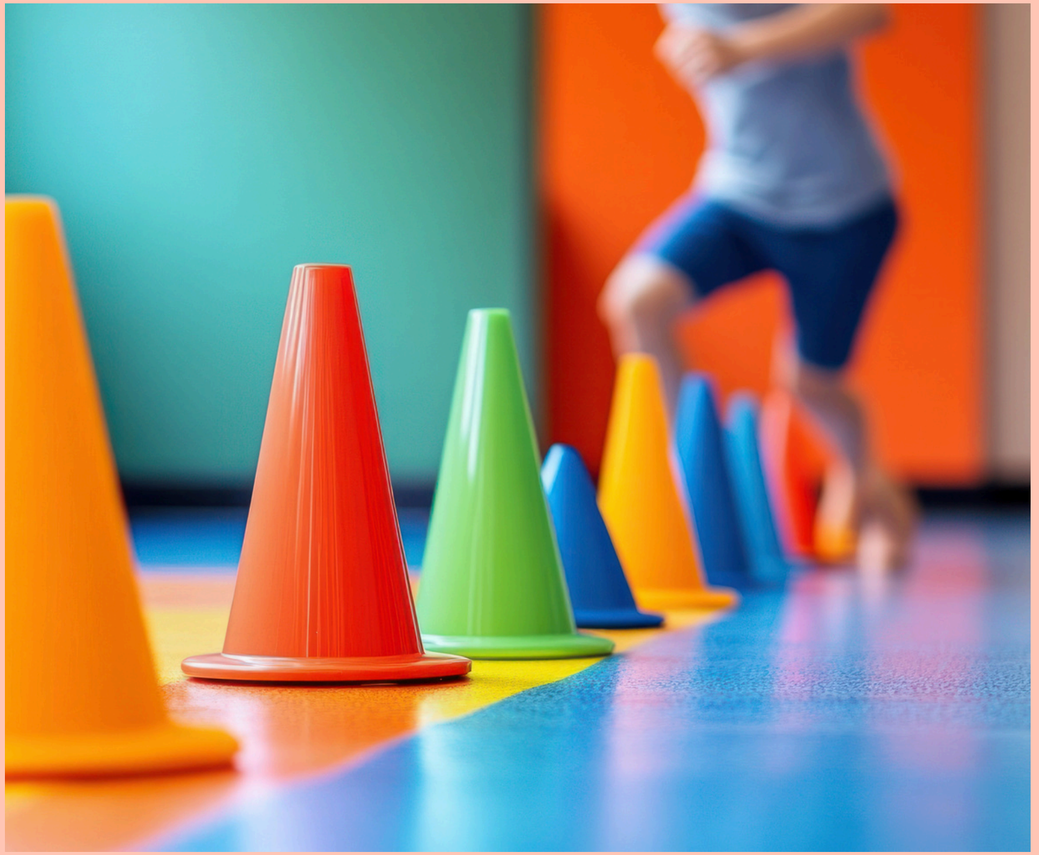
Rehabilitation Interventions for EF (Li et al., 2025)

- **Meta-analysis:** 23 high-quality rehabilitation studies on EF
- **Key finding:** Exercise interventions had the strongest effect on EF, especially:
  - Cognitive processing
  - Cognitive flexibility
- **Mechanisms of Benefit:**
  - Enhanced motor function & cognitive performance via dopamine modulation
  - Increased neurotransmitter activity & cerebral blood flow
  - Strengthened sensory-motor integration, improving attention
  - Improved self-regulation, supporting overall EF
  - Increased arousal and engagement

Key question: How do we design exercise sessions that specifically target EF?

STRATEGY 1 CONT.
APPLICATION OF EXERCISE FOR EF

- **Sung, Ku, Leung, and MacDonald (2022)**
  - Session Duration: ≥60 min, 3–5x/week → decreased fMRI activation in prefrontal cortex → improved neural efficiency
  - Exercise as Learning: Requires attention, memory, and inhibition of irrelevant behaviours
  - Aerobic Exercise: Produces greatest cognitive improvements vs. resistance, stretching, or HIIT
  - Task-Specific Challenges: e.g., kicking only a certain coloured ball → targets inhibitory control
- **Jia et al. (2024)**
  - Ball Games & Complex Tasks: Demand sustained attention, visual-spatial awareness, rapid decision-making → supports EF development
- **Clinical Applications:**
  - Use game-like activities requiring attention, memory, and inhibition
  - Provide clear, simple instructions, sequences, and reactive tasks
  - Encourage social engagement in sports
  - Incorporate variety, accounting for client strengths and interests to boost engagement and enjoyment



STRATEGY 2- VISUAL SUPPORTS

Double empathy problem = challenges in communicating information, building rapport, and delivering effective therapies (Morris et al, 2025)

- Explore alternative communication methods tailored to the client's preferences
- Autistic clients are more likely to:
  - Feel understood and validated
  - Express genuine feelings
  - Reduce masking or challenging behaviours

Support strategies enhance motor learning in children with autism (Holloway et al, 2022):

- Visual aids, Verbal prompts, Modelling, Immediate feedback
- Benefits:
  - Improved motor performance
  - Better acquisition of new skills

STRATEGY 2 CONT.

VISUAL AIDS & IMPROVED COMMUNICATION IN THERAPY

- **Forbes and Yun (2023):**
  - Picture task cards, visual activity schedules, and video prompting may enhance motor performance, improve task comprehension, reduce challenging behaviours
- **Al-Saadi and Al-Thani (2023):**
  - Mobile apps to identify and recognise emotions
  - Support emotional expression and regulation
  - Improved interpersonal and communicative skills

TAKE HOME MESSAGE

- **Understand cognitive differences:** EF and DEP shape learning, behaviour, and communication
- **Link motor skills & EF:** Poor motor performance can indicate EF challenges
- **Use evidence-based strategies:** Exercise, game-like tasks, and visual supports improve EF, motor skills, and engagement
- **Adapt communication:** Co-construct methods that respect autistic perspectives and reduce masking
- **Focus on meaningful outcomes:** Enhance learning in therapy, school, community, and daily life
- **Goal:** Foster neuro-affirming, empowering, and effective interventions for lasting impact

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